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this description that are designed to heat water to temperatures of 180 °F or higher.

Packaged boiler means a boiler that is shipped complete with heating equipment, mechanical draft equipment and automatic controls; usually shipped in one or more sections and does not include a boiler that is custom designed and field constructed. If the boiler is shipped in more than one section, the sections may be produced by more than one manufacturer, and may be originated or shipped at different times and from more than one location.

R-value means the thermal resistance of insulating material as determined based on ASTM Standard Test Method C177-97 or C518-91 and expressed in (°F·ft²·h/Btu).

Standby loss means the average hourly energy required to maintain the stored water temperature, expressed as applicable either (1) as a percentage (per hour) of the heat content of the stored water and determined by the formula for S given in Section 2.10 of ANSI Z21.10.3-1998, denoted by the term “S,” or (2) in Btu per hour based on a 70 °F temperature differential between stored water and the ambient temperature, denoted by the term “SL.”

Storage water heater means a water heater that heats and stores water within the appliance at a thermostatically controlled temperature for delivery on demand and that is industrial equipment. Such term does not include units with an input rating of 4,000 Btu/hr or more per gallon of stored water.

Tank surface area means, for the purpose of determining portions of a tank requiring insulation, those areas of a storage tank, including hand holes and manholes, in its uninsulated or pre-insulated state, that do not have pipe penetrations or tank supports attached.

Thermal efficiency for an instantaneous water heater, a storage water heater or a hot water supply boiler means the ratio of the heat transferred to the water flowing through the water heater to the amount of energy consumed by the water heater as measured during the thermal efficiency test procedure prescribed in this subpart.

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Unfired hot water storage tank means a tank used to store water that is heated externally, and that is industrial equipment.

TEST PROCEDURES

§ 431.105 Materials incorporated by reference.

(a) The Department incorporates by reference the following test procedures into Subpart G of Part 431. The Director of the Federal Register has approved the material listed in paragraph (b) of this section for incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Any subsequent amendment to this material by the standard-setting organization will not affect the Department test procedures unless and until the Department amends its test procedures. The Department incorporates the material as it exists on the date of the approval and a notice of any change in the material will be published in the FEDERAL REGISTER.

(b) *Test procedure incorporated by reference.* American National Standards Institute (ANSI) Standard: “Gas Water Heaters, Volume III, Storage Water Heaters with Input Ratings above 75,000 Btu per Hour, Circulating and Instantaneous, Z21.10.3-1998, CSA 4.3-M98, and its Addenda, ANSI Z21.10.3a-2000, CSA 4.3a-M00,” IBR approved for § 431.105. The Department is incorporating by reference the “Method of Test” subsections of sections 2.9 and 2.10 in ANSI Z21.10.3-1998, CSA 4.3-M98, and the sections referenced there, including sections 2.1.7, 2.3.3, 2.3.4, 2.30 and Figure 3.

(c) *Availability of references*—(1) *Inspection of test procedures.* The test procedures incorporated by reference are available for inspection at:

(i) National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to:
http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(ii) U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Hearings and Dockets, “Test Procedures and Efficiency Standards for Commercial Water Heaters,

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Hot Water Supply Boilers, and Unfired Hot Water Storage Tanks,” Docket No. EE-RM/TP-99-480, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585.

(2) *Obtaining copies of Standards.* Anyone can purchase a copy of the standard incorporated by reference from Global Engineering Documents, 15 Inverness Way West, Englewood, CO 80112, or <http://global.ihs.com/>, or <http://webstore.ansi.org/ansidocstore/>.

(d) *Reference standards*—(1) *General.* The standards listed in this paragraph are referred to in the Department test procedures in this subpart, but they are not incorporated by reference. These sources are given here for information and guidance.

(2) *List of References.* (i) ASTM Standard Test Method C518-91, “Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.”

(ii) ASTM Standard Test Method C177-97, “Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties

by Means of the Guarded-Hot-Plate Apparatus.”

(iii) ASTM Standard Test Method D2156-80, “Method for Smoke Density in Flue Gases from Burning Distillate Fuels.”

§ 431.106 Uniform test method for the measurement of energy efficiency of commercial water heaters and hot water supply boilers (other than commercial heat pump water heaters).

(a) *Scope.* This section covers the test procedures you must follow if, pursuant to EPCA, you are measuring the thermal efficiency or standby loss, or both, of a storage or instantaneous water heater or hot water supply boiler (other than a commercial heat pump water heater).

(b) *Testing and Calculations.* Determine the energy efficiency of each covered product by conducting the test procedure(s), set forth in the two rightmost columns of the following table, that apply to the energy efficiency descriptor(s) for that product:

Product	Energy efficiency descriptor	Use test setup, equipment and procedures in subsection labeled “Method of Test” of	With these additional stipulations
Gas-fired Storage and Instantaneous Water Heaters and Hot Water Supply Boilers*.	Thermal Efficiency	ANSI Z21.10.3–1998, § 2.9**.	<p>A. For all products, the duration of the standby loss test shall be until whichever of the following occurs first after you begin to measure the fuel and/or electric consumption: (1) The first cutout after 24 hours or (2) 48 hours, if the water heater is not in the heating mode at that time.</p> <p>B. For oil and gas products, the standby loss in Btu per hour must be calculated as follows: $SL \text{ (Btu per hour)} = S \text{ (\% per hour)} \times 8.25 \text{ (Btu/gal-F)} \times \text{Measured Volume (gal)} \times 70 \text{ (degrees F)}$.</p> <p>C. For oil-fired products, apply the following in conducting the thermal efficiency and standby loss tests:</p> <p>(1) Venting Requirements—Connect a vertical length of flue pipe to the flue gas outlet of sufficient height so as to meet the minimum draft specified by the manufacturer.</p> <p>(2) Oil Supply—Adjust the burner rate so that: (a) The hourly Btu input rate lies within ± 2 percent of the manufacturer’s specified input rate, (b) the CO_2 reading shows the value specified by the manufacturer, (c) smoke in the flue does not exceed No. 1 smoke as measured by the procedure in ASTM-D-2156-80, and (d) fuel pump pressure lies within ± 10 percent of manufacturer’s specifications.</p> <p>D. For electric products, apply the following in conducting the standby loss test:</p> <p>(1) Assume that the thermal efficiency (Et) of electric water heaters with immersed heating elements is 98 percent.</p> <p>(2) Maintain the electrical supply voltage to within ± 5 percent of the center of the voltage range specified on the water heater nameplate.</p>
	Standby Loss	ANSI Z21.10.3–1998, § 2.10**.	
Oil-fired Storage and Instantaneous Water Heaters and Hot Water Supply Boilers*.	Thermal Efficiency	ANSI Z21.10.3–1998, § 2.9**.	<p>A. For all products, the duration of the standby loss test shall be until whichever of the following occurs first after you begin to measure the fuel and/or electric consumption: (1) The first cutout after 24 hours or (2) 48 hours, if the water heater is not in the heating mode at that time.</p> <p>B. For oil and gas products, the standby loss in Btu per hour must be calculated as follows: $SL \text{ (Btu per hour)} = S \text{ (\% per hour)} \times 8.25 \text{ (Btu/gal-F)} \times \text{Measured Volume (gal)} \times 70 \text{ (degrees F)}$.</p> <p>C. For oil-fired products, apply the following in conducting the thermal efficiency and standby loss tests:</p> <p>(1) Venting Requirements—Connect a vertical length of flue pipe to the flue gas outlet of sufficient height so as to meet the minimum draft specified by the manufacturer.</p> <p>(2) Oil Supply—Adjust the burner rate so that: (a) The hourly Btu input rate lies within ± 2 percent of the manufacturer’s specified input rate, (b) the CO_2 reading shows the value specified by the manufacturer, (c) smoke in the flue does not exceed No. 1 smoke as measured by the procedure in ASTM-D-2156-80, and (d) fuel pump pressure lies within ± 10 percent of manufacturer’s specifications.</p> <p>D. For electric products, apply the following in conducting the standby loss test:</p> <p>(1) Assume that the thermal efficiency (Et) of electric water heaters with immersed heating elements is 98 percent.</p> <p>(2) Maintain the electrical supply voltage to within ± 5 percent of the center of the voltage range specified on the water heater nameplate.</p>
	Standby Loss	ANSI Z21.10.3–1998, § 2.10**.	